

Appl. No. 10/783,094
Amendment dated February 21, 2007
Reply to Office Action of November 21, 2006

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The following Listing of Claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A drive waveform-determining device comprising:
 - a condition storage section being configured and arranged to store an optimal weight and velocity of droplets to be discharged from a discharge head;
 - a weight measuring section being configured and arranged to measure the weight of the droplets having been discharged from the discharge head onto the weight measuring section;
 - a speed-measuring section being configured and arranged to measure the velocity of the droplets in flight having been discharged from the discharge head;
 - a basic drive waveform storage section being configured and arranged to store a basic drive waveform;
 - a waveform-adjusting section being configured and arranged to read the basic drive waveform from the basic drive waveform storage section and to adjust the basic drive waveform to an adjusted drive waveform so that the weight ~~that is~~ measured by the weight measuring section and the velocity ~~that is~~ measured by the speed-measuring section substantially match the optimal weight and velocity that are stored in the condition storage section for the adjusted drive waveform; and
 - an adjusted waveform storage section being configured and arranged to store the adjusted drive waveform ~~that is~~ adjusted by the waveform-adjusting section.

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2. (Previously Presented) The drive waveform-determining device according to claim 1, further comprising

a physical property value acquisition section configured and arranged to acquire physical property values of the droplets discharged from the discharge head,

the basic drive waveform storage section being further configured and arranged to store a plurality of basic drive waveforms that correspond to the physical property values of the droplets,

the waveform-adjusting section being further configured and arranged to read one of the basic drive waveforms from those stored in the basic drive waveform storage section as the adjusted drive waveform that corresponds to the physical property values acquired by the physical property value acquisition section, and

the adjusted waveform storage section being further configured and arranged to correlate and store the adjusted drive waveforms that are adjusted by the waveform-adjusting section with the physical property values acquired by the physical property value acquisition section.

3. (Previously Presented) The drive waveform-determining device according to claim 1, wherein

the waveform-adjusting section is further configured and arranged to correct the basic drive waveform that was read from the basic drive waveform storage section in accordance with a natural period of the discharge head, and to adjust the basic drive waveform.

4. (Original) The drive waveform-determining device according to claim 2, wherein

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the physical property value acquisition section is further configured and arranged to acquire at least one of viscosity, surface tension, contact angle, and density as the physical property values of the droplets.

5. (Previously Presented) The drive waveform-determining device according to claim 4, wherein

the physical property value acquisition section includes a measuring section that is configured and arranged to measure at least one of physical property of the droplets.

6. (Previously Presented) The drive waveform-determining device according to claim 1, wherein

the weight measuring section includes

an electrode configured and arranged to face the discharge head,
an oscillator configured and arranged to change frequency in accordance
with the weight of a substance deposited on an electrode surface,
a frequency counter configured and arranged to measure the frequency of the
oscillator, and
a calculating section configured and arranged to calculate the weight of the
droplets on the basis of the difference in frequency before and after
droplet deposition measured with the aid of the frequency counter.

7. (Previously Presented) The drive waveform-determining device according to claim 5, wherein

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the physical property value acquisition section is further configured and arranged to compute a viscosity of the droplets with aid of amplitude-damping characteristics of the oscillator when the droplets deposit on the electrode surface.

8. (Original) The drive waveform-determining device according to claim 1, wherein

the speed-measuring section is further configured and arranged to compute the velocity of the droplets by using the position of the droplets discharged from the discharge head at two different points in time, and using the time difference between these two points in time.

9. (Original) The drive waveform-determining device according to claim 1, wherein

the waveform-adjusting section is further configured and arranged to measure a variation in the velocity of the droplets from a plurality of nozzles of the discharge head,

the waveform-adjusting section is further configured and arranged to change the drive waveform by using at least one of an early electric potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head, and

the waveform-adjusting section is further configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal.

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10. (Original) The drive waveform-determining device according to claim 1,
wherein

the waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal.

11. (Original) The drive waveform-determining device according to claim 1,
wherein

the waveform-adjusting section is further configured and arranged to determine an electric potential VH and an early electric potential VC of the basic drive waveform so that the weight and the velocity of the droplets substantially match the values stored in the condition storage section.

12. (Currently Amended) A droplet discharge device comprising:
a discharge head being equipped with a liquid-filled unit containing a liquid material and configured and arranged to form the liquid material into droplets;
a drive control section being configured and arranged to supply a drive waveform to the discharge head to discharge the droplets by expanding or contracting the liquid-filled unit in accordance with the drive waveform; and
a drive waveform-determining device having
a condition storage section being configured and arranged to store an
optimal weight and velocity of droplets to be discharged from the
discharge head,

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a weight measuring section being configured and arranged to measure the weight of the droplets having been discharged from the discharge head onto the weight measuring section,

a speed-measuring section being configured and arranged to measure the velocity of the droplets in flight having been discharged from the discharge head,

a basic drive waveform storage section being configured and arranged to store a basic drive waveform,

a waveform-adjusting section being configured and arranged to read the basic drive waveform from the basic drive waveform storage section and to adjust the basic drive waveform to an adjusted drive waveform so that the weight ~~that is~~ measured by the weight measuring section and the velocity ~~that is~~ measured by the speed-measuring section substantially match the optimal weight and velocity that are stored in the condition storage section for the adjusted drive waveform, and

an adjusted waveform storage section being configured and arranged to store the adjusted drive waveform ~~that is~~ adjusted by the waveform-adjusting section,

the drive control section being configured to provide the discharge head with the adjusted drive waveform being determined by the drive waveform-determining device.

13. (Previously Presented) The droplet discharge device according to claim 12, further comprising

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a physical property value acquisition section configured and arranged to acquire physical property values of the droplets discharged from the discharge head,

the basic drive waveform storage section being further configured and arranged to store a plurality of basic drive waveforms that correspond to the physical property values of the droplets,

the waveform-adjusting section being further configured and arranged to read one of the basic drive waveforms from those stored in the basic drive waveform storage section as the adjusted drive waveform that corresponds to the physical property values acquired by the physical property value acquisition section, and

the adjusted waveform storage section being further configured and arranged to correlate and to store the adjusted drive waveforms that are adjusted by the waveform-adjusting section with the physical property values acquired by the physical property value acquisition section.

14. (Previously Presented) The droplet discharge device according to claim 12, wherein

the waveform-adjusting section is further configured and arranged to correct the basic drive waveform that was read from the basic drive waveform storage section in accordance with a natural period of the discharge head, and to adjust the basic drive waveform.

15. (Original) The droplet discharge device according to claim 12, wherein the speed-measuring section is further configured and arranged to compute the velocity of the droplets by using the position of the droplets discharged from the discharge

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head at two different points in time, and using the time difference between these two points in time.

16. (Original) The droplet discharge device according to claim 12, wherein the waveform-adjusting section is further configured and arranged to measure a variation in the velocity of the droplets from a plurality of nozzles of the discharge head, the waveform-adjusting section is further configured and arranged to change the drive waveform by using at least one of an early electric potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head, and the waveform-adjusting section is further configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal.

17. (Original) The droplet discharge device according to claim 12, wherein the waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal.

18. (Original) The droplet discharge device according to claim 12, wherein the waveform-adjusting section is further configured and arranged to determine an electric potential VH and an early electric potential VC of the basic drive waveform so that the weight and the velocity of the droplets substantially match the values stored in the condition storage section.

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19.-20. (Cancelled).

21. (Currently Amended) A droplet discharge method comprising:

equipping a discharge head with a liquid-filled unit containing a liquid material configured and arranged to form the liquid material into droplets;

arranging a drive control section to supply a drive waveform to the discharge head to discharge the droplets by expanding or contracting the liquid-filled unit in accordance with the drive waveform;

equipping a drive waveform-determining device with

- a condition storage section to store an optimal weight and velocity of droplets to be discharged from the discharge head,
- a weight measuring section to measure the weight of the droplets having been discharged from the discharge head onto the weight measuring section,
- a speed-measuring section to measure the velocity of the droplets in flight having been discharged from the discharge head,
- a basic drive waveform storage section to store a basic drive waveform,
- a waveform-adjusting section to read the basic drive waveform from the basic drive waveform storage section and to adjust the basic drive waveform to an adjusted drive waveform so that the weight ~~that is~~ measured by the weight measuring section and the velocity ~~that is~~ measured by the speed-measuring section substantially match the

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optimal weight and velocity that are stored in the condition storage section for the adjusted drive waveform, and
an adjusted waveform storage section to store the adjusted drive waveform ~~that is~~ adjusted by the waveform-adjusting section; and
providing the discharge head by the drive control section with the adjusted drive waveform determined by the drive waveform-determining device.

22. (Previously Presented). An electrooptical device manufactured using the droplet discharge method according to claim 21.

23. (Previously Presented) An electronic equipment equipped with an electrooptical device manufactured using the droplet discharge method according to claim 21.

24. (Previously Presented) The drive waveform-determining device according to claim 1, wherein
the speed measuring section has a camera and a strobe light.